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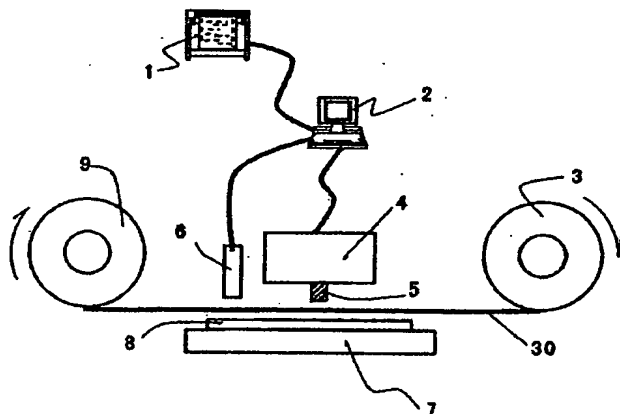
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(54) 【発明の名称】 ホログラム印字による可変情報表示媒体とこの印字装置

(57) 【要約】

【課題】一枚一枚異なるホログラム画像を持つ可変情報表示媒体とこれを簡単に作製する装置、更に、シールやカードに画像を印字することで、従来のカラー画像では表現することができない装飾性の高い可変情報表示媒体を提供する。

【解決手段】絵柄、文字等の画像情報を入力する入力手段1、該画像情報を処理する画像処理ソフトを内蔵し且つこの装置全体をコントロールする制御手段2、ホログラム転写箔リボンのレジスターマークを検知するレジスターマーク検知手段6、このレジスターマークを検知した信号に基づいて可変情報表示媒体に印字する位置を制御するサーマルヘッドを具備した転写印字制御手段4及び可変情報表示媒体を印字する位置に搬送する搬送手段7、とを少なくとも具備する可変情報表示媒体への印字装置とこれによって作製された可変情報表示媒体。



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Kokai (Jpn. Unexamined Patent Publication) No. 2000-211257  
Title of the Invention: Variable Information Presentation  
Medium for Hologram Printing and Printing Device Therefor  
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Inventors: M. Wakana; N. Asuke; T. Hamaya; Y. Sugaya; N. Fujita;  
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[Abstract]

[Objective]

The present invention provides a variable information presentation medium for storing hologram image patterns different to one another, and a device for easily producing the same. The present invention further provides a variable information presentation medium having an ability to store excellent figurative image patterns which cannot be expressed in a conventional color image, for printing the image on stickers or cards.

[Means for Solving the Problem]

A printing device for a variable information presentation medium provided with at least an input means 1 for inputting image data such as graphical patterns and characters, a control means 2 in which an image-processing software is installed for processing the image data, and which controls the whole device, a registered mark detecting means 6 for detecting a registered mark on a hologram transfer foil ribbon, a transfer-printing controlling means 4 which is provided with a thermal head to control the position to be printed of the variable information presentation medium, based on the detected signals of the registered mark, and a transfer means 7 for transferring the variable information presentation medium to the position to be printed is provided. A variable information presentation medium produced by the printing device is also provided.

## CLAIMS

1. A variable information presentation medium on which variable printing information is printed, on demand, using a hologram transfer foil ribbon.

2. The variable information presentation medium according to claim 1, wherein the variable information presentation medium is a message card or telegram in which private information is written.

3. The variable information presentation medium according to claim 1, wherein the variable information presentation medium is a card with a lottery number or mark.

4. A printing device for a variable information presentation medium provided with at least an input means for inputting image data such as patterns and characters, a control means or computer in which an image-processing software is installed for processing the image data, and which controls the whole device, a registered mark detecting means for detecting a registered mark on a hologram transfer foil ribbon, a transfer-printing controlling means which is provided with a thermal head, for controlling the position to be printed on the variable information presentation medium, based on the detected signals of the registered mark, and a transfer means for transferring the variable information presentation medium to the position to be printed.

[Detailed Description of the Invention]

[0001]

[Technical Field to which the Invention Pertains]

The present invention relates to a variable information presentation medium for thermal transfer printing by heating and printing with a heating means such as a thermal head. Particularly, the present invention relates to a technology

which realizes printing the graphical patterns of desired images or characters in the form of graphical patterns produced by a hologram on a medium such as a credit card, a bond, a certificate, a postcard or a sticker, as soon as it is required.

[0002]

[Prior Art]

In the specification, those comprising a diffraction structure, a fine projection pattern or a vertical stripe pattern having a different refractive index, which are capable of representing a three-dimensional object or distinctive figurative image, using the interference of the wavelengths or diffraction grating, are called holograms. Because a highly advanced technology is required to produce a hologram which can be also formed into a sheet, the hologram is stuck to a credit card, a bond or a certificate, as a means against counterfeit thereof. It is also used to impart a distinctive design and a figurative pattern to a book or a CD.

[0003]

A hologram is classified into a relief type which comprises a fine projection produced by a general optical photographic projection method, a volume type in which interference fringes are recorded in the thickness directions using a recording medium such as a photographic resin, or a diffraction grating type, such as the grating image and the pixelgram, in which plural simple interference gratings are positioned in a small area to produce image elements for representing an image.

[0004]

A hologram image has been produced by preparing a master hologram, preparing a nickel press mold duplicated from the master by an electric plating method, heating and pressing the same pattern to produce a large number of hologram images, and bonding the images onto presentation media. This method is advantageous for duplicating a large number of the same image and bonding them onto the media. However, images different to one another, such as picture showing a face, an ID image, and

[Mode for Carrying Out the Invention]

The mode of the present invention is described with reference to the drawings. Fig.3 shows a hologram transfer foil ribbon of the present invention. (a) is a top view of a hologram transfer foil ribbon having plural hologram image patterns. (b) is a top view of a transfer foil ribbon having only one hologram image pattern. (c) is a cross-sectional view of a constituting example.

[0009]

The hologram transfer ribbon (30) in Fig.3 constitutes plural hologram image patterns (31). A variety of hologram images including plural simple diffraction gratings having different diffraction orientations and spatial frequencies, diffraction grating images, rainbow hologram images, 3D hologram images, and combination thereof, are possible. As the number of the varieties of the hologram image patterns (31) increases, the number of colors of the hologram images constituted thereby increases, whereby a hologram image having a highly figurative pattern can be obtained. However, when the time for printing is important, three to twelve colors or patterns are preferable. The registered mark (32) is provided to control the position of a transfer means for transferring a medium, and to control the position to be printed, on the hologram transfer foil sheet (30).

[0010]

When a function to prevent counterfeit only in combination of simple numbers with characters of a lottery number or mark is provided, the hologram image pattern as shown in Fig.3(b) is sometimes sufficient.

[0011]

A release layer (42) is formed on a transfer foil substrate (40) as a support and a hologram layer (45) is formed on the release layer (42). A back-coat layer (41) is formed on the back side of the transfer foil substrate or formed on the side opposite to the side on which the release layer (42) is formed.

[0012]

The hologram layer (45) comprises a relief forming layer (43) having a hologram relief pattern on the side opposite to the release layer (42) and a reflective thin layer (44) deposited or sputtered on the hologram relief pattern. An adhesive layer (46) is formed on the reflective thin layer (44). The hologram relief pattern is formed by a conventional method, in which a nickel mold having a hologram relief pattern of fine projections is heated and pressed on the relief forming layer (43).

[0013]

The transfer foil substrate (40), a film support, can be a generally transparent polyethylene terephthalate film. Other preferred materials are one or a composite of a synthetic resin such as poly(vinyl chloride), polyester, polycarbonate, poly(methyl methacrylate) and polystyrene, a natural resin, paper and a synthetic paper. The substrate may have any thickness. Generally, the substrate is preferred to have a thickness of 10 to 20  $\mu$ m.

[0014]

The release layer (42) is provided to effectively transfer the relief forming layer (43) to the subject to be transferred. Preferable materials for the layer (42) include a thermoplastic acrylic resin, a chloride rubber resin, a vinyl chloride-vinyl acetate copolymer resin, a cellulose resin, a chlorinated polypropylene resin, or any of these resins to which is added a silicon oil, an aliphatic acid amide, zinc stearate or other inorganic substance.

[0015]

The relief forming layer (43) should be excellent in embossing capability, and should not produce surface irregularities during pressing. Further, it should show good adhesion to the release layer (42) and to the reflective thin layer (44). Typical examples of the material for the relief forming layer include a thermoplastic resin such as a polycarbonate resin, a polystyrene resin and a polyvinyl

chloride resin; a thermosetting resin such as an unsaturated polyester resin, a melamine resin, an epoxy resin, an urethane (meth)acrylate, a polyester(meth)acrylate, an epoxy(meth)acrylate, a polyol(meth)acrylate, a melamine(meth)acrylate and a triazine(meth)acrylate or a mixture thereof; and a thermoforming material having a radically-polymerizing unsaturated group.

[0016]

The reflective thin layer (44) reflects light and comprises a substance having metallic reflectivity, such as Al, Au, Ag and Cu. The layer (44) can be produced by a film-making process such as vacuum deposition, sputtering or an ion-plating method. The film is preferred to have a thickness of 10 to 1,100 nm.

[0017]

The reflective thin layer (44) can be produced also from a transparent material with a high refraction index having a reflective property and permeability. That is, it can be produced from a material which has a higher refraction index than that of the relief forming layer 231 (refraction index  $n=1.3$  to  $1.5$ ) and which is transparent. Examples of such inorganic material include  $Sb_2S_3$  ( $n=3.0$ ),  $TiO_2$  ( $n=2.6$ ),  $ZnS$  ( $n=2.3$ ),  $Sb_2O$  ( $n=2.0$ ),  $SiO$  ( $n=2.0$ ),  $Si_2O_3$  ( $n=2.5$ ),  $In_2O_3$  ( $n=2.0$ ) and  $ZnO$  ( $n=2.1$ ).

[0018]

The adhesive layer (46) can be produced using any material generally used therefore and which will not denature or affect the reflective thin layer (44). The examples of the material include a vinyl chloride adhesive, an acrylic adhesive and a polyester adhesive.

[0019]

The back-coat layer (41) formed on the back side of the transfer foil substrate (40) as a support or formed on the side opposite to the release layer (42), prevents sticking at a transfer step and prevents the transfer sheet from adhering to the thermal head. The back-coat layer (41) may be of any

constitution which can prevent the transfer sheet from adhering to the thermal head. The examples of the binder include a thermoplastic acrylic resin, a cellulose resin, a polyester resin and a silicon thermosetting EB resin. A variety of surfactants as a slip agent, a polyethylene wax and a silicon wax as a lubricants and talc as a filler may be added.

[0020]

The hologram transfer foil ribbon (30) of the above-constitution is used to transfer and print a hologram image on the variable information presentation medium as a subject to be transferred by the thermal head.

[0021]

Fig. 1 is a diagram showing a constitutional example of a device for producing a variable information presentation medium of the present invention. The device for producing the variable information presentation medium comprises major components of:

an input means (1) such as a keyboard for inputting characters, or a scanner or CCD camera for inputting graphical patterns;

a control means or computer (2) in which a function for image-processing the input characters and graphical patterns, a function for detecting the registered mark and controlling the position and the timing of printing, and a function for controlling the whole device, are installed;

a transfer means (7) for transferring the presentation medium (8) to the position to be printed, and;

a thermal head (5) for transferring the hologram image pattern of the hologram transfer foil ribbon to the presentation medium, based on the data image-processed by the control means (2).

[0022]

The image-processing software installed in the control means or computer is required to have a function to optionally select constitutional areas of the graphical patterns read, a color selection file function to prepare an image file of the



selected areas, and a data conversion function to convert the selected color file to the data capable of being printed.

[0023]

[Examples]

[Example 1]

A postcard with a lottery number or mark, shown in Fig. 2(a), was prepared by the method described below.

[0024]

(1) Preparation of a hologram transfer foil ribbon having one hologram image pattern

(a) First, the release layer (42) was prepared using a photogravure method. The coating material for the release layer, described below, was coated at a dry temperature of 110 C to have a coating thickness of 0.8  $\mu$ m, on the transfer foil substrate (40) of transparent polyethylene terephthalate (PET) film having a thickness of 12  $\mu$ m. A relief forming original roll was obtained using the photogravure method in which the relief coating layer was coated at a dry temperature of 110 C to have a thickness of 0.5  $\mu$ m.

(b) The diffraction grating by EB drawing was used as the hologram image pattern (31). That is, the original plate of diffraction grating having a spatial frequency of 1,140 line/mm, which exhibits a red color having a wavelength of 620 nm, observed when illuminated in the grating direction of right lower -21° at 45°, was used for the hologram image pattern (31), to prepare a mold by plating. The mold was heated to 165 C and was pressed on the relief forming layer (43) to form a hologram relief pattern on the relief forming layer (43).

(c) The reflective thin layer (44) was provided by vapor deposition in which an Al layer having a thickness of 0.05  $\mu$ m was formed on the relief forming layer (43) having the hologram relief pattern formed thereon. The adhesive layer (46) was provided by the photogravure method in which the coating material for the adhesive layer, described below, was coated at a dry temperature of 110 C to have a thickness of 0.5  $\mu$ m.

(d) Finally, the back-coat layer (41) was provided by the

photogravure method. The coating material for the back-coat layer, as described below, was coated on the back side of the transfer foil substrate (40) as a support or formed on the side opposite to the side on which the release layer (42) was formed, at a dry temperature 110 C, to have a thickness of 0.7 m. The hologram transfer foil ribbon was thereby obtained.

[0025]

The coating materials for producing the hologram transfer ribbon are described below.

(The coating material for the release layer)

acrylic resin      30 parts  
polyester resin    5 parts  
toluene            40 parts  
methyl ethyl ketone    40 parts  
methyl isobutyl ketone 20 parts

(The coating material for the relief forming layer)

copolymer of vinyl chloride and vinyl acetate 25  
parts

urethane resin    10 parts  
methyl ethyl ketone    50 parts  
toluene            50 parts

(The coating material for the adhesive layer)

copolymer of vinyl chloride and vinyl acetate 30  
parts

polyester resin    20 parts  
methyl ethyl ketone    50 parts  
toluene            50 parts

(The coating material for the back-coat layer)

vinyl resin 50 parts  
isocyanate hardening agent    5 parts  
silicon wax 1 part  
methyl ethyl ketone    50 parts  
toluene            50 parts

[0026]

(2) Preparation of a postcard with a lottery number or mark

A lottery number having a hologram image pattern (31) was transferred and was printed on a postcard on which prepared texts had been printed. The desired numbers, symbols and characters were input into the computer from the keyboard. Hologram image patterns in the form of numbers, symbols and characters were thereby transferred using the device shown in Fig.1. This method realizes preparation of postcards with lottery numbers different to one another.

[0027]

The variable information including lottery numbers of postcards with lottery numbers or marks is mostly printed by a printer generally in ink. In this case, tampering and counterfeiting are easily done, and some means must be used to protect the postcards or media. However, the lottery numbers having hologram image patterns are printed in the postcards with lottery numbers or marks of the present invention. The hologram image prevents tampering and counterfeiting, and another measure is not needed.

[0028]

[Example 2]

The card or Christmas card shown in Fig. 2 (b) was prepared by the following method.

[0029]

(1) Preparation of a hologram transfer foil ribbon having plural hologram image patterns

The hologram image pattern of the hologram transfer foil ribbon was prepared in the manner same as in Example 1, except that the ribbon had four different patterns.

[0030]

For the hologram image pattern R (31a), shown in Fig.3, diffraction grating having a spatial frequency of 1,140 line/mm, which imparted a red color having a wavelength of 620 nm when illuminated in the grating direction of lower right angle - 21\_ at 45\_ was used. For the hologram image pattern Y (31b),

diffraction grating having a spatial frequency of 1,240 line/mm, which imparted a red color having a wavelength of 570 nm when illuminated in the grating direction of lower right angle -7\_ at 45\_ was used. For the hologram image pattern G (31c), diffraction grating having a spatial frequency of 1,390 line/mm, which imparted a green color having a wavelength of 510 nm when illuminated in the grating direction of upper right angle +7\_ at 45\_ was used. For the hologram image pattern B (31d), a diffraction grating having a spatial frequency of 1,540 line/mm, which imparted a blue color having a wavelength of 460 nm when illuminated in the grating direction of upper right angle +21\_ at 45\_ was used.

[0031]

## (2) Preparation of a card

1. An illustration draft was read by a scanner, and the data was input into the control mean or computer (2) in which the Adobe Photoshop (Adobe System), a common image-processing software, was installed. Each of the areas of the illustration, 21a, 21b, 21c and 21d, was respectively selected. It was specified which hologram pattern was used to fill each of the area. In the example, the hologram image pattern R was selected to fill the illustration area A (21a), the hologram image pattern Y was selected to fill the illustration area B (21b), the hologram image pattern G was selected to fill the illustration area C (21c), and the hologram image pattern B was selected to fill the illustration area D (21d), and a color file was prepared.

2. The card shown in Fig. 2(b) was prepared by the device shown in Fig. 1, based on the color file. The step for preparation of the card was described below. The hologram transfer foil ribbon was delivered from a forward roller of the card printer. The registered mark pattern R (32a) was detected by the registered mark detecting means (6) to stop the hologram transfer foil ribbon (30). The data for filling with the hologram image pattern R was invoked from the color file and was sent to the transfer-printing controlling means (4). The

command to print was sent from the transfer printing controlling means (4) to the thermal head (5), while the command of transfer control was sent to the card transfer means (7).  
[0032]

The thermal head (5), receiving the command, pressed the end area of the hologram image pattern R (31a) on the presentation medium or card (8) to transfer and print the hologram image pattern R (31a). The hologram image pattern R (31a) was thereby transferred and was printed on the illustration area A (21a) of the illustration draft.  
[0033]

When transfer and printing of the hologram image pattern R (31a) is completed, the thermal head (5) is moved upward, the card transfer means (7) returns the card (8) to the original position, and sends out the hologram transfer foil ribbon (30) from the roller. In the same manner, transfer and printing was conducted based on the data for the hologram image patterns Y, G and B, respectively, to prepare the card shown in Fig.2(b).  
[0034]

The hologram image pattern for character areas was not referred to, to emphasize a difference between examples 1 and 2. However, the hologram image pattern may be used for the areas of characters and symbols in example 2.  
[0035]

Using the above-described method, a card can be produced having a desired hologram image by changing the graphical patterns of the illustration draft. Conventionally, the message cards are varied with many designs. However, messages of variable information have been printed in ink that made them look indistinctive, monotonous and less impressive.  
[0036]

#### [Effects of the Invention]

As described above, the present invention allows production of a variable information presentation medium having a desired hologram image pattern for the pattern of desired characters and graphical patterns such as

illustrations. It allows preparation of designs different to one another, qualified characters and distinctive messages which are impressive.

[0037]

Objects required to have tampering or counterfeiting prevention means, including postcards with lottery numbers or marks and lottery tickets, need not have other means to prevent tampering or counterfeiting, because the lottery numbers themselves are holograms. At the same time, there are little restrictions caused by the media.

[Brief Description of the Drawing]

Fig. 1 is a constitutional drawing which shows the outline of a transfer and printing device for a variable information presentation medium of the present invention.

Fig. 2 shows one example of the variable information presentation medium of the present invention. (a) is a top view of a postcard with a lottery number or mark. (b) is a top view of a message card.

Fig. 3 shows a hologram transfer foil ribbon of the present invention. (a) is a constitutional top view of the case in which plural hologram image patterns were provided. (b) is a constitutional top view of the case in which one hologram image pattern was provided. (c) is a constitutional cross-sectional view.

[Description of the Numerical Reference]

1. image input means; 2. control means or computer; 3. forward roller; 4. transfer-printing control means; 5. thermal head; 6. registered mark detecting means; 7. medium transfer means; 8. presentation medium; 9. take-up roller; 10. variable information presentation medium or card with a lottery number or mark; 11. variable information or lottery number; 12. printing area for predetermined information; 20. variable information presentation medium or card; 21a. illustration area A; 21b. illustration area B; 21c. illustration area C; 21d. illustration area D; 22. character areas; 30. hologram transfer

foil ribbon; 31. hologram image pattern; 31a. hologram image pattern R; 31b. hologram image pattern Y; 31c. hologram image pattern G; 31d. hologram image pattern B; 32. registered mark; 32a Registered mark for pattern R; 32b. Registered mark for pattern Y; 32c. Registered mark for pattern G; 32d. Registered mark for pattern B; 40. transfer foil substrate; 41. back-coat layer; 42. release layer; 43. relief forming layer; 44. reflective thin layer; 45. hologram layer; 46. adhesive layer